A NEW STREAM-DWELLING SPECIES OF *LITORIA* (ANURA: HYLIDAE) FROM NEW GUINEA

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Summary

TYLER, M. J., DAVIES, M. & APLIN, K. (1986) A new stream-dwelling species of *Litoria* (Anura: Hylidae) from New Guinea. *Trans. R. Soc. S. Aust.* **110**(2), 63-67, 30 May, 1986.

Litoria exophthalmia sp. nov. is described from localities at elevations of 730–850 m on the southern face of the cordillera of mainland New Guinea. The species is of moderate size (males 34–39 mm), and characterised by protruding eyes, basally webbed fingers and by the lack of a vocal sac in the male. The species is morphologically so distinctive that it is regarded the unique representative of a separate species-group.

KEY WORDS: hylid, frog, morphology, osteology, *Litoria*, new species.

Introduction

Herpetologists working on New Guinea hylids are aware of the existence of a large number of undescribed species. Delay in resolving the biological and morphological characters distinguishing closely related undescribed taxa (e.g. in the *Litoria bicolor* species-group where at least six new species await definition: Menzies & Tyler, unpubl.) is a major contributing factor. However, the recent description of a new species of *Litoria* from Irian Jaya (Tyler & Davies, 1983) brought the total described species of *Litoria* known from New Guinea to 55.

Here we describe a species which is so distinctive morphologically that it can be distinguished readily from all congeners and can be assigned to a separate species-group (*sensu* Tyler & Davies, 1978).

Materials and Methods

The specimens reported here are housed in the Australian Museum (AM), National Museum and Art Gallery, Papua New Guinea (NMA) and South Australian Museum (SAM).

Methods of measurement follow Tyler (1968). Measurements taken (in mm) were: snout-to-vent length (S-V); tibia length (TL); head length (HL); head width (HW); eye-to-naris distance (E-N); internarial span (IN); eye diameter (E). The format of the osteological description follows Trueb (1979). Cleared and stained specimens were prepared using the techniques of Davis & Gore (1947) and Dingerkus & Uhler (1977).

Litoria exophthalmia sp. nov.
FIGS 1–7

Holotype: AM R114751, an adult male obtained by K. Aplin on 14.vi.1984 at Haia village (6°42'S, 145°00'E), South Simbu Province, Papua New Guinea.

Definition: A moderate-sized species (males 34.4–39.0 mm), with basal webbing of the fingers, extensively webbed toes and protruding eyes. The male lacks a vocal sac.

Description of holotype: Head slightly broader than long (HL/HW 0.97). Head length 0.37 snout-vent length. Snout prominent, slightly rounded when viewed from above, and truncated in profile (Fig. 1). Nostrils almost entirely lateral. Eye-to-naris distance greater than internarial span (E-N/IN 1.17). Nostrils much nearer to end of snout than eye. Canthus rostralis slightly curved and well defined. Eye large and protruberant (Figs 1, 2), its diameter greater than distance separating it from nostril. Tympanum prominent and with narrow annulus, tympanum diameter 2/5 length of eye. Vomerine teeth on two large elevations between posterior margins of choanae. Tongue moderate and broadly oval.

Fingers short, with moderate lateral fringes; finger lengths 3>4>2>1; terminal discs large (Fig. 3A). Web confined to base between third and fourth fingers, reaching midway up the antepenultimate phalanx on fourth finger. Other fingers unwebbed. Hindlegs moderately long (tibia length/S-V 0.56); toe lengths 4>3>5>2>1. Web reaches midway on penultimate phalanges of third and fifth toes, and the base of the penultimate phalanx of fourth toe, continuing to each disc via narrow fringes (Fig. 3B). A small oval inner and no detectable outer metatarsal tubercle.

Skin of dorsum and lateral surfaces smooth. A narrow supratympanic fold extending inferiorly beyond superior margin of tympanic annulus. No dermal folds on posterior margin of limbs. Distinct small tubercle on heel; paired, larger tubercles beneath vent. Posterior surface of thighs smooth.

In preservative dorsum very pale brown with diffuse darker markings. Ventral surface creamish brown.

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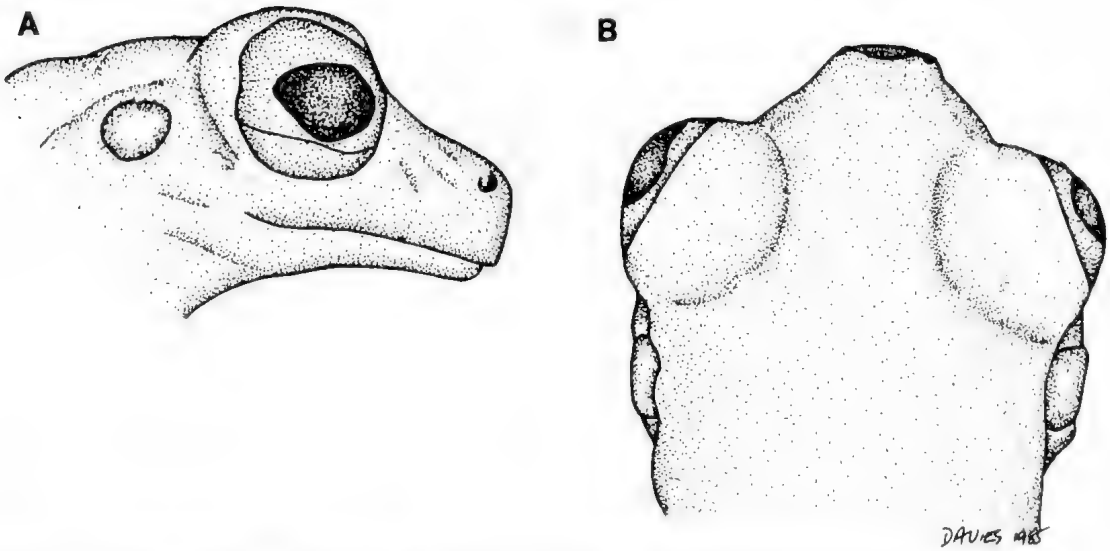

Fig. 1. A, lateral and B, dorsal views of the head of *Litoria exophthalmia* (Holotype).

Fig. 2. Holotype of *Litoria exophthalmia* sp. nov. Scale = 1 cm

Vocal sac absent. Large single nuptial pad on first digit.

Dimensions (in mm): Snout-to-vent length 35.5; tibia length 19.5; head length 13.2; head width 13.7; tympanum diameter 2.2; eye width 5.5; eye-naris distance 3.8; internarial span 3.3.

Variation: There are 14 paratypes: AM R114729, 114732, 114748 (cleared and stained), 114749, 114752–56; NMA UP7078; SAM R27831 (cleared and stained), 27832, taken at the type locality; AM R114758, Haia bush camp, 880 m, 6°40'S, 145°01'E, obtained on 19.iv.1985.

All of the paratypes are adult males bearing pigmented nuptial pads. Snout-vent length ranges 34.4–39.0 mm. Morphometric data obtained from the series are: TL/S-V 0.55–0.61, HL/HW 0.96–1.01, HL/S-V 0.34–0.39, E-N/IN 1.13–1.39.

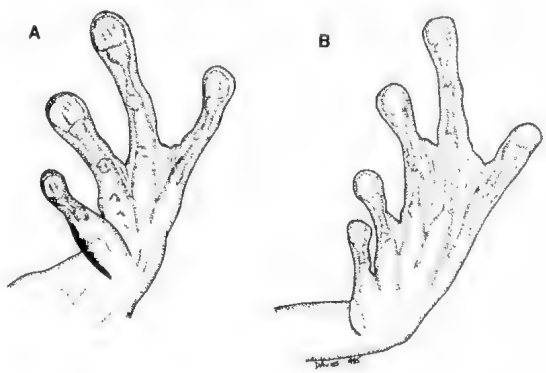

Fig. 3. A, palmar view of hand and B, plantar view of foot of *Litoria exophthalmia* (Holotype).

The only noteworthy feature in which there is variation involves the coloration. Several specimens exhibit darker markings upon the pale ground colour. In AM R114749 there is an hourglass-shaped patch on the head extending along the middle of the back. It commences across the centre of the head and upper eyelids and reaches posteriorly to the vicinity of the sacrum. This patch is composed of an area of sparse black stippling bounded by a continuous row of small, black spots. In this specimen, and others with less clearly defined dark markings, the tibiae bear broad bands of dark brown upon a paler background.

The skin of the ventral surface is partly transparent and internal organs can be seen through the skin and body wall.

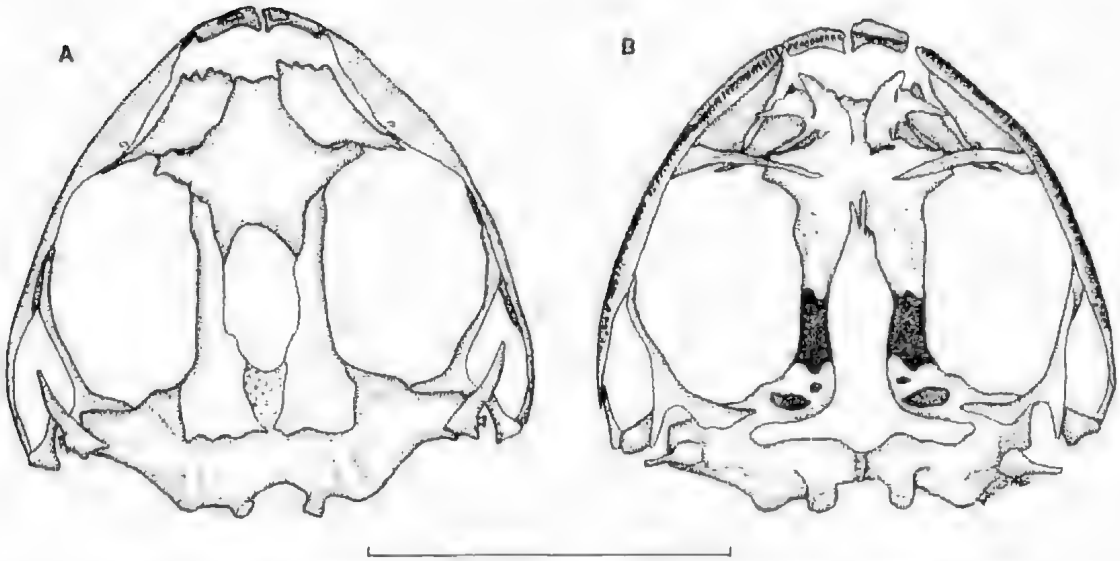

Fig. 4. A, dorsal and B, ventral view of skull of *Litoria exophthalmia* (AM R114733). Scale bar = 5 mm.

Osteology: Skull well ossified. Sphenethmoid well ossified extending between vomers ventrally and between nasals dorsomedially almost to level of medial extremities of nasals; curved laterally to accommodate posterior edges of nasals with slight overlap of lateral sphenethmoid (Fig. 4A). Prootic and exoccipitals completely fused. Exoccipitals joined ventromedially by calcified plate. Crista parotica long, very slender, overlapped laterally by expanded otic ramus of squamosal. Frontoparietal fontanelle extensive; posterior extremities defined by medial calcified plate formed between poorly ossified frontoparietal elements (Fig. 4A). Anterior margin of frontoparietal fontanelle formed by sphenethmoid at level of anterior extremity of anterior ramus of pterygoid; posterior margin slightly anterior to level of anterior extremities of epiotic eminences.

Nasals very broad, displaced laterally such that medial edges orient anteriorly (Fig. 4A). Maxillary process long and slender, in bony contact with posterior extremity of extremely deep pars facialis of maxillary. Palatines moderately long, expanded laterally, ridged and tapering acutely medially to overlie sphenethmoid posteriorly to vomerine teeth (Fig. 4B). Cultriform process of parasphenoid very robust, slender and digitiform anteriorly; broad medially. Alae long, slender, very slightly angled posterolaterally; overlapped laterally by medial rami of pterygoids.

Pterygoid robust. Medial ramus long, unexpanded, acuminate; anterior ramus long, slender anteriorly, in long contact with poorly developed pterygoid process of palatal shelf of maxillary; low truncate process dorsally on medial ramus at proximal extremity (Fig. 5A). Quadratojugal slender, in long contact with maxillary. Squamosal moderately robust. Zygomatic ramus moderately long and slender. Otic ramus broadly expanded distally. Calcified projection forming an anteroproximal edge of shaft reaching dorsal proximal process on medial ramus of pterygoid (Fig. 5A). Maxillary and premaxillary inclined slightly laterally; perpendicular to pars dentalis. Palatine processes of premaxillaries very short (Fig. 4B). Vomers entire; dentigerous processes short, horizontal to palate; right process missing in this specimen. Bony columella present. Processus coronoideus of mandible not hooked.

Hyoid plate very short. Alary processes pedunculate. Posteromedial processes ossified with proximal endochondral ossification encroaching upon the hyoid plate such that anteromedial extremities of processes confluent (Fig. 5B). Cricoid ring complete.

Pectoral girdle arciferal and robust. Omosternum and xiphisternum present; clavicles moderately slender, curved; coracoids moderately robust. Bicapitate scapula greater in length than clavicles. Suprascapula about 1/3 ossified.

Eight procoelous, non-imbricate, presacral vertebrae. Relative widths of transverse processes III > sacrum > IV > II > V = VI = VII = VIII. Sacral diapophyses poorly expanded. Urostyle bicondylar with dorsal crest extending about 2/3 its length.

Pubis calcified. Ilial crest absent (Fig. 6A). Dorsal prominence lateral, well developed (Fig. 6B). Dorsal protuberance slightly anterolateral on prominence.

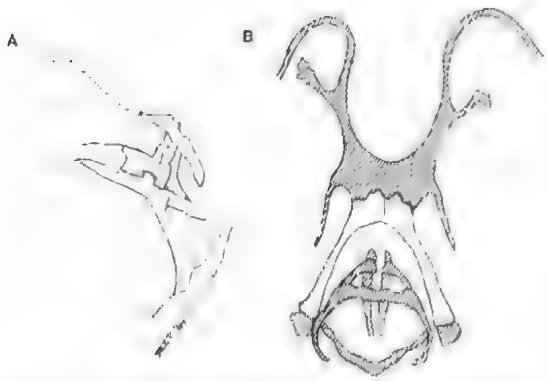

Fig. 5. A, anterior view of left posterolateral portion of skull of *Litoria exophthalmia* (AM R114733); B, Hyoid apparatus of *Litoria exophthalmia* (AM R114733), ventral view.

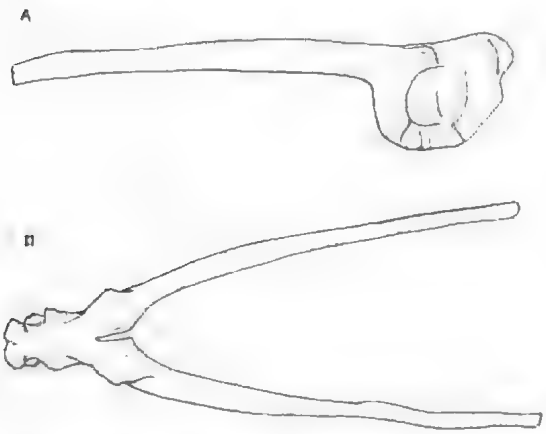

Fig. 6. A, lateral and B, dorsal view of pelvis of *Litoria exophthalmia* (AM R11473).

Phalangeal formula of hand 2,2,3,3. Terminal phalanges clawed, intercalated structures cartilaginous. Well developed prepollex. Radiale, ulnare, os centrale postaxiale and os centrale preaxiale present (Fig. 7A). Phalangeal formula of foot 2,2,3,4,3; small bony prehallux. Os distale tarsale 1, 2 and 3 present (Fig. 7B).

Variation: Comparison of AM R114733 with a second cleared and stained specimen (SAM R27831) reveals minimal variation. Variation observed involved slightly less overlap of the crista parotica region by the otic ramus, and greater calcification (possibly ossification) of the ventromedial process of the squamosal shaft.

The endochondral encroachment of the posteromedial processes on the hyoid plate was slightly less extensive so that the two bones are not confluent medially in SAM R27831.

Habitat: The two localities at which the species was obtained are 3.5 km apart, on the eastern side of

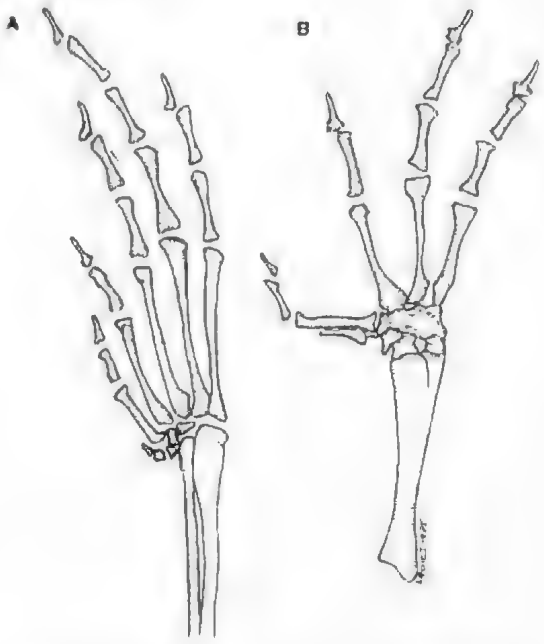

Fig. 7. Dorsal views of bones of A, hand and B, foot of *Litoria exophthalmia* (AM R11473).

the Nimi River. Most of the specimens were collected at night in low vegetation overhanging streams, and it was in fact the most common species encountered there. The floor of the streams were of sand, mud or exposed rock, and in some areas the streams were choked with leaf litter. The area was heavily forested, with an understory of numerous small saplings and occasional palms.

Etymology: The specific name is derived from the Greek *exophthalmos* meaning "with bulging or protruding eyes". In the local Pawaian language as spoken at Haia, the species is called "Nonoli".

Comparison with other species: The combination of short, basally webbed fingers, protruding eyes, lack of a vocal sac in males and form of squamosal and pterygoid processes are a suite of features not shared by any congener, and render the species so distinctive that we consider it the sole representative of a separate species-group (Tyler & Davies, 1978). Lack of a vocal sac is shared amongst Papuan *Litoria* by *L. eucnemis* and *L. genimaculata* both of which can be distinguished by the less prominent eyes, their possession of crenulated dermal ridges on the posterior edges of the limbs and, commonly, more extensive finger webbing. *Litoria exophthalmia* also exhibits proliferation of ossification upon the posterior margin of the hyoid plate, a feature associated with vocal sac loss in hylid frogs (Tyler, 1972).

Parasites: A series of parasites was obtained from the body cavity of the type series and have been

examined by Dr D. Spratt. They include a number of nematodes identified as a species of *Wartonella* (Filariodea), probably undescribed, and some encapsulated pentastomids probably representing *Porocephalus,* and also considered likely to be undescribed.

Acknowledgments

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